

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/675,557
Filing Date: Sept. 30, 2003
Applicant: Terry L. Schneider
Group Art Unit: 1774
Examiner: Brett A. Crouse
Title: Polymer Composite Structure Reinforced With Shape
Memory Alloy And Method Of Manufacturing Same
Attorney Docket: 7784-000553/CPC

Mail Stop [Amendment]
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION OF TERRY L. SCHNEIDER UNDER 37 C.F.R. §1.132

I, Terry L. Schneider, hereby declare under penalty of perjury as follows:

1. That I am the sole inventor of the subject matter of U.S. patent application serial number 10/675,557 filed on September 30, 2003.

2. That I received a B.S. in Chemistry with Honors from the University of Puget Sound (Tacoma, Washington) in 1977 and a M.S. in Chemistry from California State University, Long Beach (Long Beach, CA) in 1982.

3. That I have approximately 27 years experience in the materials sciences field, and 20 years experience with The Boeing Company ("Boeing") in advanced materials and structures research and development work, and that I am presently employed with Boeing as an Associate Technical Fellow with Boeing's "Advanced Materials & Structures Technology" group.

4. That I have reviewed U.S. Patent No. 5,770,305 to Terasaka (hereinafter "Terasaka"). In my opinion this patent does not disclose or suggest the use of shape memory alloys (SMA) to improve compression-after-impact (CAI) strength in an adhesive, a compound or a paste.

5. Terasaka involves the use of Nickel-titanium particles that are used to maintain electrical conductivity between two electrical connection terminals. In Terasaka, it is necessary for the particles to be in a "crushed" or deformed state, which means they must be used in the resin while they are in their martensitic phase. This becomes the "normal" state of the particles within the resin. Providing the particles in a martensitic state is necessary because when the resin expands, the particles need to be able to "expand" in shape via the "shape memory effect" with increase in temperature to be able to maintain electrical conductivity between the two electrical connection terminals. However, since the particles are already in their martensitic state when placed in the resin, they essentially lose any tangible ability to absorb impact energy via a stress-induced phase change from austenite to martensite, in the event the resin is thereafter subjected to an impact from an external object.

6. When the particles in Terasaka are compressed in their martensitic phase (i.e., their "normal" or typical state), they will transfer impact energy that the resin experiences to the adjacent structure. In their martensitic phase, the Nickel-titanium particles will not have impact absorbing quality (via the stress-induced phase transformation mechanism austenite to martensite). This is because the particles need to be able to utilize the superelastic quality of an SMA material, which means that they should be in their austenitic phase. It is therefore my opinion that because Terasaka employs the Nickel-titanium particles in their martensitic phase, no impact absorbing quality will be provided by the particles via the energy absorbing stress-induced phase transformation.

7. The present Boeing patent application discloses the use of SMA particles in a fundamentally different way from which the particles are used in Terasaka. In the present application, the significant energy dissipating ability of shape memory alloys is being exploited. This occurs when the SMA particles undergo deformation by the force of an impact (for a particle-filled coating or an adhesive layer). When the particles are impacted, they physically deform and transform the kinetic energy of impact to thermal energy in the form of heat release via the stress-induced austenite to martensite phase transformation, dissipating the impact energy, thereby protecting the host material. This operation is not possible with the particles in Terasaka, which as explained above are provided in their martensitic phase, and therefore not able to tangibly deform in response to an impact from an external object.

8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true;

and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Terry L. Schneider
Terry L. Schneider

10-29-07
Date